Marketing Natural Pork: An Empirical Analysis of Consumers in the Mountain Region

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ABSTRACT

The demand for organic meats, including beef and chicken, has grown dramatically in recent years. Yet, there are few branded pork products. This research examines the potential market for natural pork in the Intermountain West, with emphasis on targeting the market segment most likely to purchase this product at a significant premium. High-income, frequent pork consumers, and those that have purchased natural beef are most likely to purchase natural pork products. With respect to production-related attributes, those concerned about feed additives, and to a lesser degree, the effects of pork production on the environment, are likely target markets. [Econ-Lit subject codes: M310, Q130] © 2002 Wiley Periodicals, Inc.

Retail sales of organic foods have grown tremendously in recent years, from $178 million in 1980 to $7.6 billion in 1999, and consumers seem especially interested in naturally produced fruits, vegetables, dairy, and meat products (Duram, 1998; *The Progressive Grocer*, Annual Report 2000). For example, there are several premium beef products marketed in supermarkets, including natural brands. Yet, there are few branded or natural pork products. The absence of natural pork products may signal that consumers are less interested in the practices used to produce hogs. Alternatively, a potential market exists for hog producers willing to meet the demand of those consumers interested in other natural products, who may also purchase natural pork.

The objective of this study is to define market segments for a natural, regionally produced line of pork products and assist Colorado producers in developing a viable marketing plan. While organic meat products are only now being seen on market shelves due to the stringent requirements of the Food Safety Inspection Service (FSIS) and the only recently finalized organic standards, "natural" meat products have been available for some time. The definition of "natural meat" was not standardized at the time of the survey and how consumers should differentiate between "natural" and "organic" produce was not specifically defined. However, we assume that "natural" generally implies a less stringent

production practice than "organic" to consumers.[1] For the purposes of this study, "naturally produced meats" were defined on the survey as meat produced "from animals raised using environmentally sound practices with no antibiotics or hormones, and never confined to small or crowded pens." The largest difference between the National-Organic-Program-defined "organic" meat and our "natural" meat is that our product was not required to be fed 100% organic feed, as national guidelines require (National Organic Program, Final Rule).

Gaining a space on grocery store shelves is often the most difficult step in selling a product. Producers must enter into market relationships with distributors and grocery stores with a well-defined description of their consumers and a distinct plan for marketing and packaging their product. This study uses the results from a contingent valuation study to determine what production practices are most important to consumers, thereby enabling producers to develop an effective production and marketing plan for their pork.

A description of the potential market for food that is certified organic or natural and a summary of the contingent valuation framework are presented in the following section. The methods section then describes the survey instrument, data, and model used in this study to determine consumer demand for natural pork. The empirical results of the study are presented as marginal effects and used to define viable target markets for natural pork. The general findings are then discussed in the context of previous research on organic, natural, and meat marketing. Finally, the article concludes with a discussion of marketing implications and plans for future research.

1. BACKGROUND RESEARCH

1.1. Consumer Trends and Research

In order to effectively market natural pork, it is important to understand trends in general pork consumption. Analysis of the 1992 Consumer Expenditure Survey from the Bureau of Labor Statistics found that household size is positively related to pork chop and ham expenditures (Nayga, 1995). Expenditures on ham and pork chops show a quadratic correlation with age and income, increasing up to some level and then declining as age and income get significantly higher. Moon and Ward (1999) estimated a two-stage model where demand for pork was the dependent variable. Results show that household size, education, and age have significant impacts on demand for pork. Education's effect is negative, while age and household size are positive. Income level was found to be insignificant in predicting demand for pork. This study will allow us to test whether similar patterns exist among the market segment likely to buy natural pork.

Colorado producers are interested in determining whether there is a distinct segment of consumers who are willing to pay a premium for locally produced food. A Canadian study focused on determining the premium a consumer would pay according to the production origin of the beef (Unterschultz, Quagrainie, & Veeman, 1998). That study concluded that product origin is considered a quality attribute, and consumers were willing to pay a significant premium for local meat. Thus, producers may be able to capture a significant premium if Colorado consumers similarly value local food products.

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[1]The survey was specifically focused on "natural" products at the request of the producer group that funded the study.

1.2. Natural and Organic Food Markets

Sales of natural and organic foods through conventional supermarkets more than doubled from 1993 to 1995 ($98 to $210 million), and in 1999, *The Progressive Grocer* estimated organic food sales in conventional markets at $7.6 billion. This growth signals the increasing mainstream appeal of organic foods, which may be linked to both internal and external factors. Byrne, Bacon, and Toensmeyer (1994) found that preferences for organic produce are linked to perceptions that such products are safer, fresher, more nutritious, and cause less detrimental environmental impact. In this research, we will focus on both the demographic information of consumers and how they value a set of production attributes and characteristics related to the meat they purchase.

A paper by McGuirk et al. (1990) provides a cluster analysis that describes target markets for products based on their food safety characteristics. The target market they suggest as having the best potential for marketing products with increased food safety at a premium has a median age of 43 and is 56% female. Most members of the cluster (65%) work outside the home and average $28.26 per person per week on groceries. The income level of this cluster ($29,854) is higher than the sample average ($26,126), and the average number of children is 1.88. Furthermore, the members of this cluster are "highly concerned about health hazards associated with additives and preservatives, nitrates, . . . , and antibiotics and hormones in animal feed."

Concerns about food safety related to residues on food are compounded with concerns about biotechnology. Biotechnology methods were intended to increase production efficiency, but led some consumers to question the overall effect on food quality and safety. For example, consumers have shown reluctance to consume pork injected with pST (a growth hormone) due to a lack of information regarding the health risks from this additive. Women and those with larger households were less likely to buy the pST-injected pork (Misra, Gotegut, & Clem, 1997). Similar concerns have been raised with respect to livestock antibiotics and the irradiation of meat.

In addition to determining what consumer segments are most interested in buying natural pork products, there is also interest in what price premiums such consumers are willing to pay for these products (so that additional production or marketing costs can be justified). Several studies have found that consumers are willing to pay a premium for products that are free of chemicals and additives (van Ravensway & Hoehn, 1991; Huang, 1996). Misra, Gotegut, and Clem (1997) found that 60% of consumers prefer organic produce, and 75% of those consumers are willing to pay at least a 10% premium.

The challenges of marketing natural products once consumer preferences have been determined are not clear. The underlying issue of the market information problem is quality signaling. If producers cannot differentiate their product, securing premiums for the unique bundle of attributes their product may offer consumers cannot be achieved. Previous research concluded that quality signaling is most easily accomplished through the use of a certified label (Zarkin & Anderson, 1992; Caswell & Mojduszka, 1996), which is now an option for natural and organic meats, given the newly released USDA guidelines. The national organic standards allow packages to be labeled as "100% organic," "organic," and "made with organic" products, and permit the use of a USDA organic label (*NOP Final Rule*).

This study tried to determine what other issues that could be integrated into production practices and included on the label might be of value to the consumer. These included the use of antibiotics and the question of animal welfare. Animal welfare was addressed through

the rating-of-importance of enough room for the animals, which is important in the new organic standards (Section 205.239 of NOP specifically addresses the issue). Antibiotic use was also addressed in the attribute ratings, and both variables were included in the econometric analysis.

1.3. Contingent Valuation Methods: Issues to Consider

A contingent valuation mail survey was conducted for this study. The shortcomings of the CV methodology have been under scrutiny by several researchers in the food-safety field (Buzby, Ready, & Skees, 1995; Fox, Shogren, Clem, & Kliebenstein, 1998). In short, it is not clear that consumers' revealed preferences match their stated preferences since actual purchases are never made. Sample selection bias, nonresponse bias (Eklof & Karlsson, 1997), and unfamiliarity with the hypothetical product, price, or marketplace are all potential shortcomings of the CV method. Although our methods were not altogether unaffected by such issues, our data source controlled for the former biases.

The data used for this study (and described in more detail below) came from a random geographic sample provided by a national market research agency. Moreover, we were able to test for nonresponse bias since there were data available on nonrespondents from the survey firm's database. A simple test showed that income levels (expected and found to be a significant factor in willingness to pay and targeting market segments) did not differ between respondents and nonrespondents. Other variables that were tested included lifestage, household size, and race. Though lifestage did not differ across subsamples, household size was significantly larger for nonrespondents. Race was also significantly different, indicating that more surveys were received from respondents considering themselves White. However, the lack of response by ethnic respondents was expected, and the larger household size nonresponse may be negligible since it was not a significant variable in our model.

2. THE DATA AND MODEL

A survey of rural, suburban, and urban consumers in Colorado, Utah, and New Mexico explored consumers' willingness to pay for natural, locally produced pork products. Twenty-two hundred primary grocery shoppers were surveyed by mail from the National Family Opinion (NFO) database, and fourteen hundred useable responses were collected (slightly greater than 60% of the sample). National Family Opinion (www.nfo.com) was used to conduct the survey based on its strong reputation in the market research industry and its readily available database of consumers willing to respond to surveys, thereby assuring high response rates. The standard NFO database was used, but for this study, a specific geographic area was targeted. Beyond targeting the geographic region, no other sample stratification was implemented.

The main impetus for the selection of the survey area was based on defining the regional market that the producers (who funded this study) could likely serve. Although the regional nature may be a limiting factor, there are two reasons why this area may be of interest. First, two of the major natural meat brands were founded in Colorado (Coleman and Maverick), so consumers in this area have had exposure to a natural beef product. Also, one of the major natural food chains (Wild Oats) has a corporate headquarters in this region, thereby indicating a regional interest in natural products. Finally, the funding for this study came from a group of producers located in the area.

The survey instrument was pretested with focus groups conducted by NFO and the survey was edited according to those results to assure accurate responses. The variables included in the survey and methods of analysis were based on previous research of organic, natural, and meat market. Past shopping information was collected, including average weekly expenditures on all grocery products, consumption of pork, consumption of beef, past consumption of natural beef, and primary store used for meat purchases. Table 1 defines the variables included in the analysis and presents basic statistics.

Thompson and Kidwell (1998) found that those who shop in specialty markets are significantly different from supermarket shoppers. To collect the information on multiple store choices, the survey was structured to allow responses on where most, some, and none of meat purchases were made. There was great interest among our producers about whether those who shop in supermarkets would be likely customers, or if they would need to target natural food stores and meat shops. The NAT1, NAT2, and SHOP2 variables were included to answer this question. NAT1 represents those who do most of their shopping in natural food markets, while NAT2 represents those who do some of their shopping in these stores. SHOP2 represents those who do some of their shopping in specialty meat shops. Because of the way the question was structured, there may be overlap where, for example, respondents did some meat shopping at a natural food store and most at a supermarket. These overlapping variables were included for two reasons. First, they represent sizeable segments of consumers who do not do all their shopping in supermarkets. Second, if only NAT1 had been included, its very small share of consumers would have been too little to provide a useful comparison against supermarket shoppers.

Detailed sociodemographic information was provided by NFO, and the rationale behind several of the variables is based on their experience in conducting market research for companies introducing new product lines to the marketplace. The lifestage variable is part of the sociodemographic data provided by the NFO and combines the respondent's age, number of children, and employment status. This variable is constructed by the NFO to incorporate these demographic factors into one measure, and thereby represent some of the most common marketing segments as they are grouped for advertising and marketing purposes. For instance, a household that has a young, married couple and no children is represented as a unique variable. Given the data integrated into the lifestage variable, independent variables related to age and family status were not included.

Consumers were asked to rate their relative concern about antibiotics, growth hormones, and various other attributes. These responses help to determine what characteristics established during production, and highlighted in marketing materials and product labels, would make the products most attractive to customers. The production attributes that consumers rated were: no small or crowded pens, no antibiotics, no growth hormones, managed grazing to protect streams, managed grazing to protect endangered species, animals raised within 250 miles, meat aged at least 14 days, and grass-fed animals.[2] These attributes were rated independently, on a Likert-like scale of 1 to 5, with 5 being the most important. The respondents were not asked the importance of these attributes in

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[2]Since the survey was conducted for beef and pork producers, and the issues of "concentrated" or "corporate" farms were not of concern to them, these issues are not specifically addressed. However, the "grazing managed to protect endangered species" and "grazing managed to protect streams" attributes are related to concentrated farming, as the disruption of animal life and water contamination can be results of concentrated farming.

TABLE 1.   Variable Names and Descriptions

Variable Names	Variable Description	Mean
INC5CAT	Five income categories from <$15,000 to >$75,000 1=<$15,000; 2=$15,000 to 30,000; 3=$30,000 to $50,000; 4 = $50,000 to $75,000; 5⇒$75,000	2.973
HHSZ5CAT	Five categories where 1 is equal to a household size of 1 and 5 is equal to a household size greater than 5	2.385
EXPWKY	Seven categories from <$50 to $499 1=<$50; 2=$50 to $99; 3=$100 to $149; 4=$150 to $199; 5=$200 to $299; 6=$300 to $499; 7=$300 to $499; 8=$500+	2.085
FREQPORK	At home pork consumption in categories from < once a week (1) to 4 or more times a week (5)	4.281
BUYCHOP	Probability of purchasing pork chops saved from first stage	0.637
BUYHAM	Probability of purchasing ham saved from first stage	0.668
Attributes	Ranked from 1 (not important) to 5 (very important)	**Mean Rank**
PENS	No small or crowded pens	3.106
ANTIBIOT	No antibiotics	3.475
HORMONES	No growth hormones	3.814
STREAMS	Grazing managed to protect streams	3.441
ENDANG	Grazing managed to protect endangered species	3.276
LOCAL	Animal born and raised within 250 miles	2.408
AGED	Meat aged at least 14 days	3.006
GRASSFED	Grass-fed animals	3.010
Lifestage	Combined age and household composition information	**Sample (%)**
YSINGLE	Equals 1 if young single, <35	5.23
MSINGLE	Equals 1 if middle-aged single, 35–65	12.35
OSINGLE	Equals 1 if older single, >65	8.94
YCOUPLE	Equals 1 if young couple, <45, no kids	6.76
WRKOCPL	Equals 1 if working old couple, >45, no kids	13.37
RETOCPL	Equals 1 if retired old couple, no kids	11.70
YPARENT	Equals 1 if young parent, <45, kid <6	14.54
MPARENT	Equals 1 if middle parent, <45, kid >6	11.34
OPARENT	Equals 1 if older parent, >45, any kid	13.15
ROOMMATE	Equals 0 if roommates	2.63
Past Natural Beef Consumption		
DNBFYES	Equals 1 if purchased natural beef	17.02
DNBFNO	Equals 0 if have not purchased natural beef	63.34
Meat Shopping Choices		
SMKT1	Equals 1 if most meat purchased at a supermarket	87.88
SMKT2	Equals 1 if some meat purchased at a supermarket	7.96
NAT1	Equals 1 if most meat purchased at a natural food store	1.17
NAT2	Equals 1 if some meat purchased at a natural food store	0.06
SHOP1	Equals 1 if most meat purchased at a meat shop	1.82
SHOP2	Equals 1 if some meat purchased at a meat shop	14.31

their decision to purchase meat; instead, they were asked to rate these attributes on "how important these attributes are to you."

Finally, survey respondents were asked about their willingness to pay for natural pork products. Each respondent chose from a scale of 1 to 10, incrementally increasing pre-

miums for hypothetical pork chops and ham (see below). The pork products were defined in the following manner:

Please imagine that you are at the counter where you usually buy fresh meat. Two types of meat are available, "regular" and "naturally produced." The naturally produced meat is from animals born and raised within 250 miles of where you live. The meats are displayed identically; their color, fat and size are exactly the same.

Ham—*Regularly Costs $3.29/lb*										
Cost Per Lb.	$3.30	$3.59	$3.89	$4.19	$4.49	$4.79	$5.09	$5.39	$5.69	$5.99	$6.29
a) Reasonable to Pay	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
b) Begin to be Expensive	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
c) Too Expensive	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

To maintain prices that mirror those found in markets, all prices on the survey ended with a "9." This did keep us from establishing easy threshold points (10%, 20%, 30%), but was necessary to maintain a realistic price set for consumers to choose from. The only stated difference between conventional pork and the new product was that the product was labeled as natural and was produced regionally. No certification or government standards were mentioned, and the survey's definition of natural was not reemphasized at this time. Note that the respondents were asked to check three price levels, so there is a full set of information on price sensitivity. For this study, we will focus on the price that the respondent found reasonable to pay.

Curves illustrating the share of consumers willing to pay various premium levels for the natural ham and pork chops are presented in Figures 1 and 2. The curves incorporate cumulative shares, so that any one who is willing to pay $5.00 per pound is assumed to also be willing to pay $4.00 per pound. The overall number of people willing to pay some premium for natural ham is greater than the share that will pay a premium for pork chops. Moreover, a small share of the market is willing to pay a higher percentage premium for ham (topping out at a 64% premium compared with 46% for pork chops). It is interesting to note that the highest price consumers are willing to pay is $5.69 for both products, regardless of the lower baseline price of ham. This may indicate that consumers are unwilling to pay more than some "threshold price" for any meat product.

Although there is a relatively small share of the market willing to pay more than 10% above normal prices for natural pork, this finding is consistent with the share of market currently paying such prices for natural food products. These stated market shares may also add credibility to the results from the contingent valuation method since they mirror the revealed preferences (current market share) for natural beef in this region (per personal discussions with several grocery managers).

3. ESTIMATION

Targetable market segments for the two pork products were determined by estimating a two-stage probit model with two equations (one each for ham and pork chops at the 18% premium level). Since the study was originally intended to assist producers in establishing relationships with traditional supermarkets, and the managers of these markets were concerned about moving sufficient volume, we felt it was necessary to target the 18%
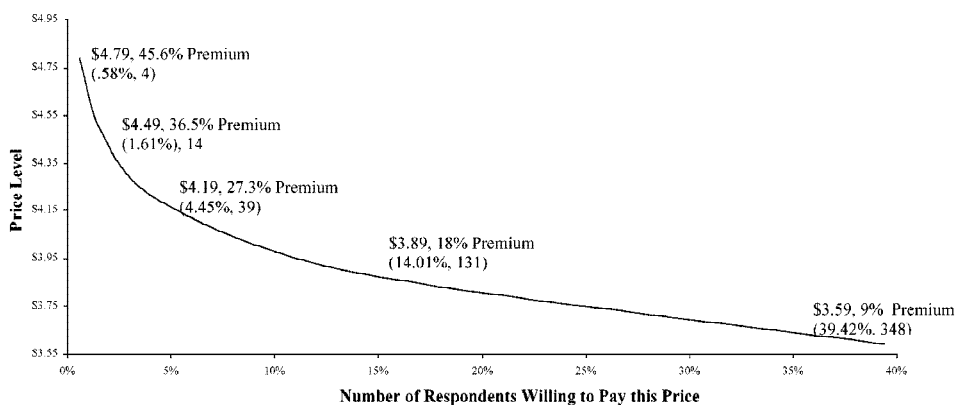
Figure 1   Cumulative willingness to pay for natural ham curves.

premium level, (6% to 14% of the consumers responding to this survey). Given that some consumers may choose not to purchase locally produced natural pork at any price, a two-step probit estimation is appropriate. The survey was worded so that the consumer could choose whether or not to purchase the product, and then designate the premium they were willing to pay if they chose to make the purchase.

The probit that is run in each stage is:

$$P[\text{BUY}_i = 1] = \Phi(\beta' x_i)$$

where BUY equals the probability that the consumer is: 1) willing to purchase the natural pork at any price in the first stage, and, 2) willing to pay at least an 18% premium in the second stage.
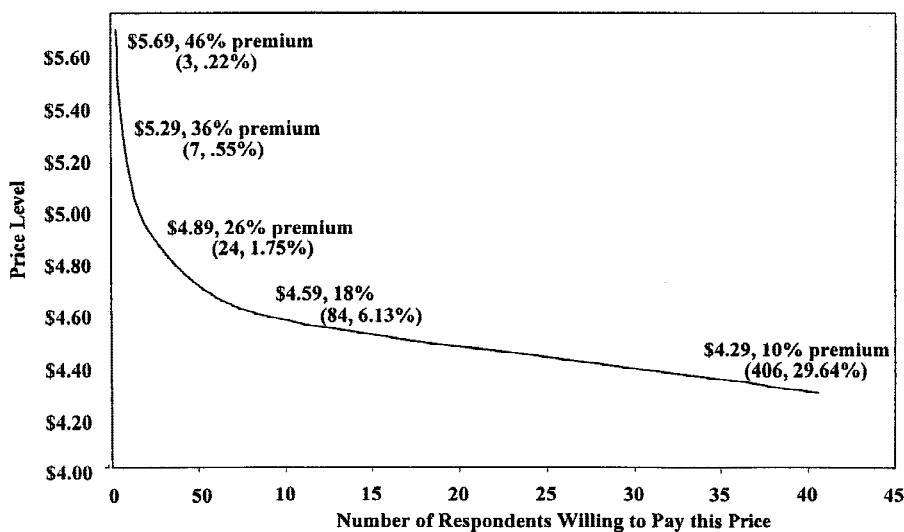

Figure 2   Cumulative willingness to pay for natural pork chops.

Φ = the cumulative distribution function of the standard normal distribution

x_i = 1st stage: (NAT1, NAT2, SHOP2, FREQPORK, HHSZ5CAT, YSINGLE, MSINGLE, OSINGLE, YPARENT, MPARENT, OPARENT, RETOCPL, WRKOCPL)

2nd stage: (EXPWKY, NAT 1, NAT 2, SHOP 2, FREQPORK, DNBFYES, HHSZ5CAT, YPARENT, OPARENT, RETOCPL, WRKOCPL, YSINGLE, OSINGLE, MSINGLE, HORMONES, PENS, ENDANG, ANTIBIOT, STREAMS, LOCAL, DNBFYES, INC5CAT, BUYHAM/CHOP)

β' = the vector of coefficients associated with the variables

The variables included for ham and pork chops at each stage were identical.

We argue that, for the first stage, the model will delineate what types of consumers are interested in local, natural pork, without being affected by their price sensitivity. Thus, demographics and shopping behavior were the only variables included in this stage (see Table 1 for variable definitions). The probabilities from the first stage estimation were saved, and included as the BUYHAM or BUYCHOP variable in the second set of estimations. These variables were included since they contained important information about the respondent's decision to purchase the product, without including price information. This is akin to the process of including the inverse Mills ratio in the second stage of the Heckman model for sample selection.

The targetable market segments for the two pork products were determined by estimating a probit model based on the consumer's willingness to buy the specified product at an 18% price premium. The second model includes the demographic and shopping behavior used in estimating likely consumers, but also incorporates several variables that may indicate price sensitivity, as well as how important various natural food product characteristics may be to the consumer (see Table 1). These variables were based on the literature presented above, NFO market research protocol, and the production attribute list described above.

The probit models were estimated in LIMDEP 7.0. Estimation using a logit model was also performed, but there were no differences in the significance of variables, although the values of coefficients did change slightly. The nature of the data would lead one to choose an ordered probit for estimation, but the extremely small share of responses above the 18% premium level and categorical nature of most of the explanatory variables led to estimation problems with the ordered model. Thus, the two-stage model (separating the purchase and price choices) was used for this study.

4. FINDINGS

4.1. First Stage: Who Will Buy Natural Pork?

Table 2 presents the results for the first probit estimation of likely customers of natural pork (those who will purchase at some price). For both pork chops and ham, those who already do some shopping in natural food or meat shops are more likely to purchase, while those who purchase pork more frequently are less likely to buy these meat products

TABLE 2.   First-Stage Results: Probability of Purchasing Pork Chops or Ham

Dependent Variable	Pork Chops		Ham	
	Coefficient	T-Ratio	Coefficient	T-Ratio
Constant	1.337*	5.7132	0.849	3.6699
NAT1	−0.172	−0.5305	−0.065	−0.1981
NAT2	0.286**	1.8286	0.210	1.3476
SHOP2	0.161	1.5436	0.096	0.9239
FREQPORK	−0.185*	−5.3493	−0.105	−3.0288
HHSZ5CAT	−0.026	−0.4262	−0.014	−0.2256
YSINGLE	−0.252	−1.2351	0.046	0.2280
MSINGLE	−0.251	−1.4778	−0.070	−0.4200
OSINGLE	−0.488*	−2.7434	−0.096	−0.5413
YPARENT	0.099	0.5386	0.199	1.0891
MPARENT	−0.073	−0.3994	0.207	1.1279
OPARENT	−0.057	−0.3313	0.029	0.1726
RETOCPL	−0.452*	−2.9043	−0.146	−0.9517
WRKOCPL	−0.081	−0.5303	0.167	1.1029

*Indicates significance at the 5% level. **Indicates significance at the 10% level.

(as would be expected). These results are consistent across the two meats, but there are several lifestage variables that only affect the likelihood of consumers purchasing the pork chops (with neutral effects on ham).

Older single and retired old-couple households are less likely to buy pork chops, while some of the demographics denoting families with children seem more likely to buy the natural ham (although these results are insignificant). This indicates that the target market for these products may be different, even though some factors affect the interest in pork chops and ham similarly. As discussed previously, the probabilities from this estimation were included as BUYCHOP and BUYHAM in the next stage of estimation.

4.2. Second Stage: Who Will Pay a Premium for Natural Pork?

The estimation results and marginal effects for the second-stage equation are presented in Tables 3 and 4. The marginal effects are comparable to more familiar elasticities of ordinary least-squares estimates. They represent the change in probability of purchase due to a one-unit (category) change in each variable, or the difference between 0 and 1 for dummy variables. Marginal effects were calculated at the means of all other variables by LIMDEP, which was used to estimate the probit models. The t-statistics can be interpreted traditionally, as they are assumed to be asymptotic in large samples.

For both products, weekly expenditures and income have a positive effect on the likelihood of a consumer purchasing at a premium (expenditures are more important for pork and income is more significant for ham). These findings support past studies that found a notable income effect for natural and organic foods. Also, the consumer's past purchase of natural beef signals a higher propensity to buy this product at a premium.

TABLE 3.   Second-Stage Results: Probability of Paying a 18% Premium

Dependent Variable	Pork		Ham	
	Coefficient	T-Ratio	Coefficient	T-Ratio
Constant	−4.626	−0.5320	−1.216	−0.4960
EXPWKY	0.246*	3.7100	0.014	1.2860
NAT1	0.442	0.6300	0.058	0.5630
NAT2	0.107	0.1190	−0.089	−0.4040
SHOP2	−0.027	−0.0520	0.000	0.0030
FREQPORK	0.186	0.3230	0.036	0.3260
DNBFYES	0.368*	2.5800	0.087*	3.7980
PENS	0.055	0.9450	0.020*	2.2250
ANTIBIOT	0.120**	1.8000	0.002	0.1890
HORMONES	−0.096	−1.3460	0.005	0.4830
STREAMS	−0.066	−0.8220	−0.008	−0.6600
ENDANG	0.090	1.2060	0.008	0.7610
LOCAL	−0.001	−1.5360	0.000	−0.6960
INC5CAT	0.071	1.3290	0.017*	2.0220
HHSZ5CAT	−0.051	−0.3760	−0.028	−1.2480
YSINGLE	−0.069	−0.0800	−0.106	−1.4520
MSINGLE	−0.086	−0.1020	0.005	0.0570
OSINGLE	0.031	0.0190	−0.067	−0.5710
YPARENT	−0.310	−0.7540	−0.010	−0.0470
MPARENT	−0.348	−0.9850	−0.117	−0.5240
OPARENT	−0.837*	−2.4690	−0.047	−0.8850
RETOCPL	−0.180	−0.1210	−0.014	−0.0860
WRKOCPL	−0.478	−1.4480	−0.087	−0.4830
BUYCHOP/HAM	2.293	0.2590	1.137	0.3770

*Indicates significance at the 5% level. **Indicates significance at the 10% level.

Unlike the previous model, shopping location does not seem to affect willingness to pay a premium for either of the pork products. Neither of the variables that represented the purchase choice (BUYHAM and BUYCHOP) was significant in this model, although they did have the expected, positive effect. Beyond the set of results with common implications for the two products, there are also some significant and unique findings in the pork chop and ham models.

For ham, likely consumers are more concerned about the use of pens, and few other factors matter significantly. Among the target pork-chop consumers, concern about antibiotics and endangered species is more important, while locally produced is less important to these consumers. Finally, older parents are far less likely to buy the natural pork chops at a premium.

5. MARKET IMPLICATIONS

The study's original hypothesis was that lower premiums may attract a relatively large customer base among those who shop at supermarkets. Alternatively, a higher premium may be feasible if producers target a smaller group who frequently shops at natural food

TABLE 4.   Marginal Effects for Second-Stage Results

	Pork		Ham	
	Marginal Effect		Marginal Effect	
Dependent Variable	(%)	T-Ratio	(%)	T-Ratio
Constant	−43.31	−0.5320	−121.61	−0.4960
EXPWKY	2.30*	3.7100	1.38	1.2860
NAT1	4.14	0.6300	5.83	0.5630
NAT2	1.00	0.1190	−8.91	−0.4040
SHOP2	−0.25	−0.0520	0.03	0.0030
FREQPORK	1.74	0.3230	3.62	0.3260
DNBFYES	3.44*	2.5800	8.69*	3.7980
PENS	0.52	0.9450	2.04*	2.2250
ANTIBIOT	1.12**	1.8000	0.19	0.1890
HORMONES	−0.90	−1.3460	0.54	0.4830
STREAMS	−0.62	−0.8220	−0.79	−0.6600
ENDANG	0.84	1.2060	0.82	0.7610
LOCAL	−0.01	−1.5360	−0.01	−0.6960
INC5CAT	0.66	1.3290	1.67*	2.0220
HHSZ5CAT	−0.48	−0.3760	−2.76	−1.2480
YSINGLE	−0.65	−0.0800	−10.62	−1.4520
MSINGLE	−0.81	−0.1020	0.50	0.0570
OSINGLE	0.29	0.0190	−6.73	−0.5710
YPARENT	−2.90	−0.7540	−1.01	−0.0470
MPARENT	−3.26	−0.9850	−11.72	−0.5240
OPARENT	−7.84*	−2.4690	−4.70	−0.8850
RETOCPL	−1.69	−0.1210	−1.45	−0.0860
WRKOCPL	−4.47	−1.4480	−8.73	−0.4830
BUYCHOP/HAM	21.47	0.2590	113.74	0.3770

*Indicates significance at the 5% level. **Indicates significance at the 10% level.
Note: Marginal effects were calculated at the means of each variable.

markets, such as the Alfalfa's[3] (Whole Foods Subsidiary) chain in the targeted region. Although the type of store where consumers shop makes a difference in the decision whether to purchase the pork, market choice is not significantly different among those who will pay the producer's desired price. Also, it appears that income level and food expenditures are relatively more important descriptors in this model.

These results suggest that natural pork may be considered a complement to natural beef, not a substitute, as is generally the case. This conclusion is drawn from the significant and positive relationship between the probability of purchasing the new, natural pork product and past purchases of natural beef. This indicates that producers may be able to reach most of their targetable market by placing their product in supermarkets located in high-income areas. A cross-tabulation on the data indicates that the consumers who have purchased natural beef in the past still shop primarily in traditional supermarkets. This is plausible in the Intermountain region since changing marketing conditions have led larger, commercial stores to offer branded natural beef. Positioning new natural

[3]Alfalfa's, a Colorado natural products store, was purchased shortly after the survey was completed by Wild Oats, a national chain of natural products stores.

pork products alongside natural beef will help producers reach a key consumer group. This is strong evidence for pork producers to present to retailers who currently carry natural beef products in order to secure space alongside natural beef in the glass case where most premium meat cuts are displayed.

Target consumers seem concerned that their meat is environmentally and animal friendly, so the producers must ensure that these production practices are emphasized in marketing materials and packaging. To attract consumers to their natural product, the producers should identify their production practices on the labels for both ham and pork chops. The absolute ratings of these attributes led us to conclude that environmental and welfare issues could be important variables in our model, but that was not the case. Only pens had a positive and significant relationship in the ham equation. It was also surprising that hormone and antibiotic-free practices were not more important (antibiotics and hormones were insignificant attributes for ham consumers while hormones had an insignificant, negative relationship in the pork-chop target market), given the perceived potential for a consumer backlash about meat from animals treated by antibiotics. One possible explanation is the fact that natural beef consumers (a significant factor in this model) may be a proxy for those concerned about chemicals and additives, since most current natural beef products make claims about their product.

Natural or organic product sections are becoming more common in mainstream supermarkets, and developing a natural meat section is a logical next step. Alternatively, even higher premiums could be charged if producers segment their marketing plan and develop retail relationships with natural food stores (even though this would represent a far smaller absolute market). In either case, carrying pork (along with currently available beef and chicken products) will provide the retailers with a meat case that satisfies a wide range of customers. The store will benefit by carrying a new product, which this analysis indicates a significant portion of consumers are willing to purchase, and the producers will have secured a viable market for their product.

In short, concentrating on store location, consumer income level, and product placement may be the most effective allocation of marketing resources. This runs counter to the current strategy of other Western livestock producers that targets numerous small natural food or meat stores.

6. CONCLUSIONS

The producers who commissioned this study have some clear results from a large regional market study that they can use to position their product in appropriate markets with information on the share of customers who are likely to pay various price levels. The target consumers are very concerned about some of the production practices utilized by the producers. If production practices are altered to attract these consumers, a highly visible and descriptive label should be included in marketing materials. To further characterize the target market to potential food distributors or retailers, it can be said that these consumers are wealthy, do not consume pork on a regular basis (from first-stage estimation), and occasionally shop at natural food stores and meat shops.

Placing these products in stores located in a high-income area and developing a marketing campaign emphasizing hormone and antibiotic-free production appear to be the best options available to these producers. Production practices should be featured in advertisements and product labels at the point of sale. Now that federal organic label regulations are available, there may be opportunities to complement regulated standards with

unique assurances the producers are willing to provide. Other in-store promotions could be developed that concentrate on the production practices and local aspect of the product if the supermarket managers believe it complements their own marketing strategies.

One of the original assumptions in framing this study was that "local" or "regional" products are valued more highly than natural products shipped in from distant production sites. However, "regional production" (local) was the least valued of all the ranked attributes. Yet, the "willingness to pay" question combined both the "natural" and "local" attributes, so including "local" on a label with other attributes may be effective. Further research into the value of a local labeling is still necessary before it can be promoted as a distinct and effective value-added marketing tool.

Future research using this particular data set can provide insights into the nature of the marketplace. This study assumes the market segments are distinct and discontinuous. It may be appropriate to revise this assumption and estimate these markets using an ordered bivariate process such as an ordered probit or logit.[4] This may also provide information on the general nature of consumption and identify thresholds of willingness to pay categories for consumers in specific market segments.

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[4]As suggested previously, the discontinuous nature of the descriptive variables and small higher premium levels make the ordered probit model unsatisfactory for estimation as it is specified now. Further research into this type of model is beyond the scope of this article.

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